This paper presents ongoing investigations on calculation and measurement of rotordynamic coefficients for brush-labyrinth gas seals. The seals are tested on static and dynamic test rigs to measure leakage, pressure distribution, and seal specific forces. To predict seal performance a full three-dimensional eccentric CFD model is considered. Rotordynamic coefficients are calculated using the whirling rotor method. The bristle pack of the brush seal is modeled using the porous medium approach. The prediction results show some deviations in absolute values of stiffness and damping coefficients in comparison with the experimental values, but the trends are similar. Comparing with a staggered labyrinth seal, the brush seal improves rotordynamic characteristics in most cases. Position of the brush seal in sealing configuration has a great influence on the stiffness and damping coefficients, while leakage performance remains relatively unaffected. The capability of the brush seal model based on the porous medium approach to predict rotordynamic coefficients is discussed.